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REMARKS

Favorable reconsideration of this application is requested. Claims 1, 3 and 13 are pending in the application. Claim 1 has been clarified to confirm that at least one of aluminum and aluminum oxide is contained in a mixed state in the at least one electrode, and is supported for example by Example 1, page 9, line 34 to page 10, line 1. Claim 13 has been canceled without prejudice or disclaimer. Claim 14 is new. The limitation in claim 14 concerning the AuAl_2 alloy and at least one of elemental aluminum and aluminum oxide being contained in a mixed state in the at least one electrode is supported for example by Example 1, page 9, line 31 to page 12, line 6. No new matter has been added.

Claim rejections - 35 U.S.C. § 112

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The presence of both elemental aluminum and aluminum oxide in the electrode is clearly described in the specification (page 9, lines 34-37, page 10, lines 10-12 and page 11, lines 13-15). Accordingly, Applicants respectfully submit that claim 1 complies with the written description requirement.

Claim 3 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The basis for excluding "1" is supported for example by Table 1. In Table 1, a larger ratio of (current output in hydrogen)/(current output in the air) indicates a higher oxygen blocking ability of the electrode of the hydrocarbon sensor (page 11, lines 4-7). As indicated in the table, the oxygen blocking ability is satisfactory when the molar ratio of $\text{AuAl}_2 : \text{Au} = X : 1-X$, where X is at least 0.6 and less than 1 (page 12, lines 2-6). When X is "1", then as shown in No. 16, there is less than satisfactory oxygen blocking ability (Table 1).

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Therefore, Applicants respectfully submit that claim 3 complies with the written description requirement.

Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The rejection is rendered moot as claim 13 has been canceled. Applicants do not concede the correctness of the rejection

Claim rejections - 35 U.S.C. § 103

Claims 1, 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1 041 380 A2 (EP '380). Applicants respectfully traverse this rejection.

Claim 1 requires "a" and "b" to satisfy the relationship: $a + 2b \leq 7$, where a content of elemental Al in the at least one electrode is "a" mol%, and a content of aluminum oxide in the at least one electrode is "b" mol%, and where at least one of the elemental Al and aluminum oxide is contained in a mixed state in the at least one electrode including Au and Al. As is apparent from Table 1, it was found that a hydrocarbon sensor containing 7 mol % or less of an initial Al simple substance (i.e., Al simple metal) in the electrode is unlikely to be influenced by the heat cycle and has higher reliability (page 11, lines 10-13). However, an Al simple substance in the electrode gradually may be oxidized to become aluminum oxide due to the heat cycle and the like during use (page 11, lines 13-15). Therefore, considering such a state, by using the electrode satisfying the above requirements, it is possible to obtain a highly reliable hydrocarbon sensor that is unlikely to be influenced by the heat cycle (page 11, lines 15 to page 12, line 1).

Claim 3 further requires that the at least one electrode contains AuAl_2 and elemental Au in a molar ratio of $\text{AuAl}_2 : \text{Au} = X : 1-X$, where X is at least 0.6 and less than 1. As shown in Table 1, when the electrode contains AuAl_2 and elemental Au in such a molar ratio, the oxygen blocking ability is very satisfactory (page 12, lines 2-6).

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EP '380 discloses an alloyed layer containing Al. However, the reference fails to teach or suggest obtaining a highly reliable hydrocarbon sensor that is resistant to heat degradation by having at least one electrode that contains Au and Al with a content "a" mol% of elemental Al and a content of "b" mol% of aluminum oxide that satisfies $a + 2b \leq 7$, where at least one of elemental Al and aluminum oxide are mixed therein. Therefore, claim 1 is not obvious over the reference.

Even further, although EP '380 discloses using an Al-Au intermediate phase, EP '380 also discloses that it is preferable not to use elemental Au, since exposure of Au to the cathode surface as a metal Au phase activates oxygen to ions on the surface of the cathode, thereby moving the oxide ions to the electrolyte (paragraph [0028]). The reference notes that as a result, oxygen ion current as well as proton current is detected across the electrodes, thereby causing output errors (Id.). Therefore, the reference teaches away from claim 3, which requires the use of elemental Au. In fact, the reference further points out that if the Al content is lower than the 4 wt%, a free Au phase appears with any Al-Au intermediate in the alloyed layer and readily may react to the oxygen in the atmosphere, thereby adversely affecting the output current from the sensor due to the presence of the oxygen (paragraph [0029]). Therefore, claim 3 is not obvious over the reference.

With respect to claim 14, nothing in the reference teaches or suggests that the AuAl_2 alloy and at least one of elemental aluminum and aluminum oxide contained in a mixed state in the at least one electrode would provide any advantages such as improved current output ratios.

Favorable reconsideration and withdrawal of the rejection are respectfully requested.

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Double Patenting

Claims 1, 3 and 13 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of US Patent No. 6,638,406 in view of EP '380. Applicants respectfully traverse this rejection.

The rejection uses EP '380 for reasons similar to the rejection under 35 U.S.C. 103, and therefore, US Patent No. 6,638,406 and EP '380 are removed for at least the same reasons discussed above.

Favorable reconsideration and withdrawal of the rejection are respectfully requested.

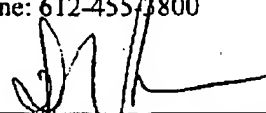
In view of the above, favorable reconsideration in the form of a Notice of allowance is requested. If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 455.3804.

Respectfully submitted,

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